

## **REMARKS**

The Office Action dated May 23, 2006, has been received and carefully noted. The above amendments and following remarks are being submitted as a full and complete response thereto. Claims 1-6 are pending in this application. By this Amendment, claim 1 is amended. Support for the amended features can be found in the specification at, for example, page 8, lines 21-27. No new matter has been added. Reconsideration of the application is respectfully request.

The Office Action rejects claims 1-3 and 5-6 under 35 U.S.C. §103(a) over Gopalraja et al. (U.S. Patent No. 6, 193,855) in view of Shimamura et al. (Patent No. 4,963,239); and claim 4 under 35 U.S.C. §103(a) over Gopalraja and Shimamura and further in view of Yamamoto (U.S. Patent Application Publication No. 2002/0173144). The rejections are respectfully traversed.

In particular, none of the above references alone or in combination, disclose or suggest a bias sputtering film forming process for forming a thin film, wherein a thin film is formed on a substrate and sputtering film forming is performed while continuously varying the substrate bias voltage, wherein the substrate corresponds to a stored substrate bias voltage value in a database stored in a control system, as recited in independent claim 1, and similarly recited in independent claim 5.

Gopalraja teaches a method an apparatus for achieving conformal step coverage of one or more materials on a substrate using sputtered ionized material (Abstract). However, the Office Action impliedly admits that Gopalraja fails to disclose or suggest that the substrate bias voltage responds to a stored value in a data base stored in a

control system, as recited in independent claim 1 and similarly recited in independent claim 5.

Shimamura teaches a sputtering process of a substrate biasing system and an apparatus for carrying out the same, capable of forming a film in satisfactory surface coverage over a stepped underlying layer (Abstract). In fact, during the film forming process, the biasing condition in Shimamura can be stabilized by detecting the substrate bias voltage  $V_{dc}$  and controlling the output of the radio frequency power supply 120 through a feedback circuit 151 to vary the level of the voltage wave form so that the substrate bias voltage  $V_{dc}$  will meet the data included in the file (Fig. 1; Col. 12, lines 42-48). In Shimamura, the data files merely contain data representing the deepest substrate bias voltage,  $V_d$  the shallowest substrate bias voltage  $V_s$ , the duty factor, the period and the wave form (column 13, lines 31-35). Accordingly, the information from the data files is used to generate a wave form sent to the voltage pulse generator 105, which generates a voltage pulse signal by which the output power of the radio frequency power supply 120 to be applied to the substrate electrode 104 is varied periodically (column 10, lines 36-40). Accordingly, it appears that the bias voltage function in Shimamura is merely a mathematical function, and Shimamura fails to disclose or suggest that the bias voltage corresponds to a stored substrate bias voltage value, as recited in independent claim 1, and similarly recited in independent claim 5. Accordingly, Shimamura fails to cure deficiencies in Gopalraja in disclosing or rendering obvious the features of independent claims 1 and 5.

Yamamoto teaches a method of manufacturing a semiconductor device that forms an agglomeration free seed layer of the inner surface of a recessed portion so as to restrain voids in a metal filled by the plating method (see abstract). However, Yamamoto fails to cure deficiencies in both Gopalraja and Shimamura in disclosing or rendering obvious the features of independent claims 1 and 5. Accordingly, independent claims 1 and 5, and their dependent claims, are patentable over all the applied reference.

For at least these reasons, the independent claims 1 and 5 and their dependant claims are patentable. Accordingly, withdrawal of the rejections of the claims under 35 U.S. C. §103(a) is respectfully requested.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is encouraged to telephone the undersigned representative at the number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. The fee for this extension may be charged to our Deposit Account No. 01-2300. The Commissioner is hereby

authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300 referencing our Docket No.: 101136-00095.

Respectfully submitted,



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Attachment: Petition for Extension of Time (three months)

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